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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/534,459

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Hiroshi Kurakata

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2292 7590 06/06/2008  
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EXAMINER

THOMPSON RUMMEL, PONDER N

ART UNIT

PAPER NUMBER

1795

NOTIFICATION DATE

DELIVERY MODE

06/06/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/534,459	<b>Applicant(s)</b> KURAKATA, HIROSHI	
	<b>Examiner</b> PONDER N. THOMPSON RUMMEL	<b>Art Unit</b> 1795	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3,5,6 and 8-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,5,6 and 8-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 23, 2008 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

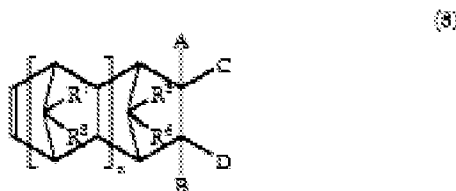
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 8-12, 16-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suwa et al (US 6,692,887) in view of Yasunami et al (US 6,696,219).

With respect to claims 1-3, 8-12, 16-24 Suwa et al discloses a radiation sensitive resin composition that is excellent in transparency can be used in the production of semiconductor devices (column 2, lines 45-51) and is capable of forming a positive photoresist pattern resin film (column 19, lines 18-21) comprising:

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- An alkali-soluble resin having an alicyclic skeleton of formula (8)  
(column 6, lines 43-51)



wherein A, B, C and D represents a hydrogen atom, halogen atom, monovalent halogenated hydrocarbon (column 6, lines 43-67) and where at least one of C and D represents a (CH<sub>2</sub>)COOH group (acidic carboxyl group - column 7, lines 5), and where n is 0 or 1 (column 3, line 64 and column 6, line 61). The resin is produced by ring-opening polymerization (column 6, lines 43-45) followed by hydrogenation with a catalyst (column 14, lines 1-5);

- a catalyst comprising ruthenium, Ru (column 14, lines 19-21 and column 28, lines 16-17) that is coordinated with a complexing agent such as triphenylphosphine (column 11, lines 7-9 and for example chlorohydrocarbonyltriphenylphosphine ruthenium - column 28, lines 16-17);
- An acid generating agent (column 19, line 11) such as a 1,2-napthoquinonediazide-5-sulfonylchloride or a 1,2-napthoquinonediazide-5-sulfonic acid ester of 1,1,1-tris(hydroxyphenyl)ethane (column 20, lines 1-8); and

- A solvent such as cyclohexanone among others (column 24, lines 6-39).

Suwa et al also discloses a method of forming a photoresist pattern wherein the above composition is applied to the substrate to form a film (column 24, line 44), applying radiation to the resin film to form a pattern (column 24, lines 49-50) followed by post-exposure baking (column 24, line 60) and development (column 25, lines 9-10) to obtain a pattern. Although Suwa suggest that additional additives can be added to the resist composition above (column 23, lines 38-40), Suwa et al fails to discloses the use of a crosslinking agent within the disclosed positive resin composition above.

Yasunami et al discloses a positive resist laminate comprising a heat-crosslinking agent such as a melamine compound (column 12, lines 6-13) and a repeating unit comprising an alicyclic monomer as shown in polymer examples (P-10), (P-11) and (P-12) in columns 23-26. The heat crosslinking agent is used to react with a polymer to form a crosslinking structure that generates an acid by heat. The use of the heat crosslinking agent is to improve stability (column 12, lines 30) and further to improve adhesion, dry etching resistance and high resolution (column 1, lines 57-60). Therefore, it would have been obvious to one of ordinary skill within the art at the time of the invention to include the use of a heat-crosslinking

agent as disclosed by Yasunami within the composition of Suwa to improve stability, adhesion, dry etching resistance of the resist pattern and further to provide high resolution and sensitivity.

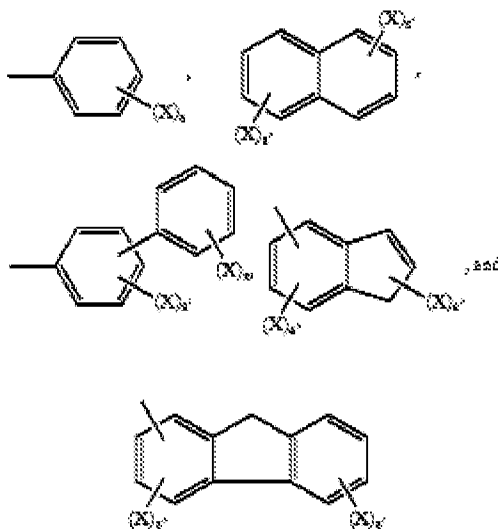
4. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suwa et al (US 6,692,887) in view of Yasunami (US 6,696,219) as applied to claims 1 and 10 above, and further in view of Jayaraman et al (US 6,147,177).

With respect to claim 15, Suwa in view of Yasunami discloses the radiation sensitive composition as disclosed above, however, Suwa in view of Yasunami fails to disclose the use of an additional alicyclic monomer having an aromatic group and aprotic polar group bonded to.

Jayaraman et al further discloses a monomer having a phenylamide group as represented by formula (I) that can be also used in combination with the monomer of formula (II) (column 17, lines 18-22),



wherein at least one of R<sup>1</sup> to R<sup>4</sup> must be selected from an aromatic ring containing substituents: - (CH<sub>2</sub>)<sub>n</sub>NHC(O)G and -C(O)NH(CH<sub>2</sub>)<sub>n</sub>G, G is an aromatic group selected from the following moieties (column 3, lines 55-65 and column 4, lines 1-10)



wherein X represent  $\text{OR}^{14}$  or  $\text{R}^{15}$  (column 4, lines 11), a, a' and a'' represents the number of times substituent X is substituted on the ring system and a is an integer from 1 to 5, a' is an integer from 1 to 4 and a'' is an integer from 1 to 3 (column 4, lines 20-24), m is an integer from 0 –5, preferably 0 to 1 (column 3, line 50), n is an integer from 0 to 5 (column 3, lines 50-51),  $\text{R}^{14}$  is a hydrogen, linear or branched ( $\text{C}_1$  to  $\text{C}_{10}$ ) alkyl,  $-\text{C}(\text{O})\text{CH}_3$ , tetrahydropyranyl, t-butyl and  $\text{R}^{15}$  is a hydrogen, cyano, halogen, and  $-\text{C}(\text{O})\text{O-t-butyl}$  (column 4, lines 23-28).

The addition of the above monomer having aromatic groups provides higher resolution and transparency to short wavelength imaging radiation while being resistant to ion etching (column 2, lines 52-56). Further, the addition of aromatic groups on substituted polymer/monomers helps to promote thinner line widths and sub micron feature dimensions (column 1, lines 16-25). Therefore, it would have been obvious to one of ordinary skill within the art at the time of the invention to include a polycyclic monomer as disclosed by Jayaraman within the

composition of Suwa in view of Yasunami to enhance resolution, transparency and to promote thinner line width thus providing smaller patterning sizes.

5. Claims 5, 6, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suwa et al (US 6,692,887) in view of Yasunami (US 6,696,219) as applied to claims 1 and 10 above, and further in view of Tsunogae et al (US 6,486,264).

With respect to claims 5, 6, 13 and 14, Suwa in view of Yasunami discloses the radiation sensitive composition as claimed above, however, Suwa in view of Yasunami fails to disclose the use of an organoruthenium compound in which a neutral electron donating ligand, such as a heterocyclic carbene compound with a nitrogen atom, is coordinated.

Tsunogae et al discloses a process for producing hydrogenated ring-opening polymer in which an organoruthenium compound can be used as a polymerization catalyst. Further, the polymerization catalyst has a ligand that has a neutral charge (column 6, lines 35-40). Such neutral electron donor compound consists of heteroatom containing carbene compounds which are represented by formulas [5] and [6] (column 7, lines 22-40). Examples of polymerization catalyst that include ruthenium compounds having two heteroatom-containing carbene compounds coordinated thereto are bus (tricyclohexylphosphine) benzylidenruthenium dichloride, bis(triphenylphosphine)-3,3-diphenylpropenylideneruthenium dichloride and bis(1,2-diisopropylidene)sol-2-ylidene)benzylidenruthenium dichloride (column 8, lines 48-54).



When the polymerization catalyst contains an organoruthenium compound and a heteroatom-containing carbene compound, the catalyst exhibits a higher activity for ring opening polymerization (column 2, lines 17-22) and provides a hydrogenation product with a high yield (column 2, lines 9-13). Also, when the catalyst is used after completion of the polymerization, the catalyst can be easily removed (column 2, lines 12-15). Therefore, it would have been obvious to one of ordinary skill within the art at the time of the invention to use a polymerization catalyst that contains an organoruthenium compound and a heteroatom-containing carbene as disclosed by Tsunogae et al. within the photoresist composition of Suwa et al in view of Yasunami to produce high yield of hydrogenated product and enhance activity for ring opening polymerization.

### ***Response to Arguments***

6. Applicant's arguments, see page 8-12 of Remarks, filed February 25, 2008, with respect to the rejection(s) of claim(s) 1-15 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Suwa et al in view of Yasunami. Suwa et al in view of Yasunami discloses the positive radiation sensitive resin comprising an alicyclic structure, an acid generator, a ruthenium catalyst, a solvent and the use of a heat-crosslinking agent meeting the limitations set forth by the applicant.

***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to PONDER N. THOMPSON RUMMEL whose telephone number is (571)272-9816. The examiner can normally be reached on Monday-Friday 7:00 am - 4:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. N. T./  
Examiner, Art Unit 1795

/Cynthia H Kelly/  
Supervisory Patent Examiner, Art Unit 1795